REMARKS

Claims 1 – 50 are pending in the application. By this amendment, claims 1, 4, 11, 16, 24-26, 28, 32, 34, 43 and 46-48 are amended. Applicant respectfully asserts that the language added to the claims is disclosed in the application and may be found at pages 9, 25 and 31. No new matter is added to the specification.

Applicant gratefully acknowledges the Examiner's allowance of claims 9 and 27.

Claims 1-7, 10-11, 13-15, 25, 32-39, 41-42 and 46 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,525,722 to Deering. Claim 8 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering. Claims 12, 26 and 40 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of U.S. Patent No. 6,101,277 to Go. Claims 16-23, 28-30 and 43-45 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of U.S. Patent No. 4,772,947 to Kono. Claim 24 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Kono and further in view of Go. Claim 31 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Kono and further in view of U.S. Patent No. 6,680,976 to Chen et al. Claims 47-48 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Lyche et al., "Knot Removal for Parametric B-Spline Curves and Surfaces". Claim 49 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Demmel, Applied Numerical Linear Algebra. Finally, claim 50 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of U.S. Patent No. 6,487,312 to Kostrzewski et al. Applicant respectfully traverses the rejections.

Claim Rejections – Independent Claims Rejected Under 35 USC §102(e)

Claims 1-7, 10-11, 13-15, 25, 32-39, 41-42 and 46 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,525,722 to Deering. Dependent claim 8 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering. Dependent claims 12, 26 and 40 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Go. Dependent claims 47-48 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Lyche, et al. Dependent claim 49 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Demmel. Finally, dependent claim 50 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Kostrzewski et al. Applicant respectfully traverses the rejections.

Claims 1-8, 10-11, 13-15, 25, 32-39, 41-42 and 46

The present invention is a graphical data-compressor for compression of received, arbitrary graphical data for subsequent transmission, said graphical data-compressor comprising (1) an input for reception of said received arbitrary graphical data, (2) an analyzer linked to said input and operable for analysis of said received arbitrary graphical data into constituent geometrical parts, where at least some of said constituent geometric parts comprise predetermined shapes and forms, (3) a scene describer, linked to said analyzer for description of said at least some of said constituent geometrical parts as a functional description of said received arbitrary graphical data, where said functional description comprises a high level functional form representing one of said constituent geometrical parts, and (4) a transmitter linked to said functional scene describer for transmission of said functional description.

The present invention is also an analytic form describer for describing constituent geometrical parts of arbitrary graphical data as an analytic description, said analytic form describer comprising: (1) a register of predetermined shapes and forms, and (2) an analytic form fitter for associating said predetermined shapes and forms with said geometrical parts.

The present invention is also a method for compressing arbitrary graphical data, comprising: (1) analyzing said arbitrary graphical data into constituent geometrical parts, where at least some of said constituent geometric parts comprise predetermined shapes and forms, (2) describing said constituent geometrical parts as functional description of said constituent geometrical parts of said arbitrary graphical data, where said functional description comprises a high level functional form representing one of said constituent geometrical parts, and (3) transmitting said functional description.

The present invention is also a graphical data-compressor for compression of received, arbitrary graphical data for subsequent transmission, said graphical data-compressor comprising: (1) an input for reception of said received arbitrary graphical data, (2) an analyzer linked to said input and operable for analysis of said received arbitrary graphical data into constituent geometrical parts, where at least some of said constituent geometric parts comprise predetermined shapes and forms, (3) a scene describer, linked to said analyzer for description of said at least some of said constituent geometrical parts as a functional description of said received arbitrary graphical data, where said functional description comprises a high level functional form representing one of said constituent geometrical parts, and (4) a geometrical part compressor operatively

associated with said scene describer and said analyzer, for reduction of constituent geometric parts not described by said describer, into a reduced quantity of data.

Similarly, Deering discloses a graphics compressor for use in reducing the space necessary to store three-dimensional graphics objects, as well as to reduce the time necessary to transmit a compressed three-dimensional object. See column 8, lines 17-21. Deering teaches a method wherein surface portions of an image are examined to determine the regularity of the portion. Irregular surfaces are encoded in a different format from regular surfaces. See Figs. 5-7.

However, Deering does not disclose at least the use of a high level functional form representing constituent geometrical parts determined by an analyzer linked to an input and operable for analysis of received arbitrary graphical data into constituent geometrical parts, where at least some of said constituent geometric parts comprise predetermined shapes and forms, as required by independent claims 1, 25, 32 and 46. A predermined shape and form, as defined by the specification at, *inter alia,* page 5, includes standard geometric types, such as cylinders and cones. A high-level functional form, as defined by the specification at, *inter alia* page 9, is the representation of a geometric entity by a procedural description of a basic geometrical form describing the entity i.e., a standard geometric type, followed by the parameters of the entity, thus providing the information needed for reconstruction of the entity.

Instead, Deering discloses only the determination of the *regularity* of a surface and the selection of a representational technique based on the determination. The determination of the graphical elements comprising an image in terms of standard geometric types, and their use *as a description,* is neither disclosed nor suggested by

Deering. Therefore, independent claims 1, 25, 32 and 46 are not anticipated by Deering under 35 U.S.C. § 102(e).

Because dependent claims 2-7,10-11, and 13-15 depend from independent claim 1, and dependent claims 33-39 and 41-42 depend from independent claim 32, these claims are therefore also not anticipated by Deering under 35 U.S.C. § 102(e). Moreover, claim 8, depending from independent claim 1, is not obvious under 35 U.S.C. § 103(a) over Deering. Accordingly, Applicant respectfully requests that the aforementioned rejections under 35 U.S.C. § 102(e) and 35 U.S.C. § 103(a) be withdrawn.

Claims 12, 26 and 40

Go teaches the use of an edge detector in the compression of a digitized image. The algorithm trims edges so that each edge may have a uniform thickness. See col. 16, lines 57-64. However, Go does not teach the modification of a predetermined shape by trimming, as required by dependent claims 12 and 40. Moreover, Go does not teach trimmed combinations of predetermined basic geometrical elements, as required by claim 26. Therefore, Go does not overcome the deficiencies of Deering.

Because Go does not overcome the deficiencies of Deering as to these claims, dependent claim 12, which depends from independent claim 1, dependent claim 26, which depends from independent claim 25, and dependent claim 40, which depends from independent claim 32, are not obvious under 35 U.S.C. § 103(a) over Deering in view of Go. Accordingly, Applicant respectfully requests that the aforementioned rejection under 35 U.S.C. § 103(a) be withdrawn.

Claims 47-48

Lyche, et al. disclose lossy data compression in the knot removal for parametric B-spline curves and surfaces. See p. 229, section 10. Lyche, et al. teach a three-step method entailing, *inter alia,* a ranking function measuring the significance of a knot in representing a spline and an approximate and remove function to determine the maximum number of knots that can be removed such that the corresponding spline approximation yields an error smaller than a given tolerance. See p. 221.

However, Lyche, et al. fail to teach at least the removal of knots having no effect on the reproduction of a geometrical part, as required by claim 48. Moreover, Lyche, et al. fail to teach at least a pattern identifier for identifying patterns of knots and an indexer for replacing each identified pattern with an index, as required by claim 49. Therefore, Lyche, et al. fail to overcome the inadequacies of the Deering reference.

Because Lyche et al. does not overcome the deficiencies of Deering as to these claims, dependent claims 47 and 48, which depend from independent claim 46, are not obvious under 35 U.S.C. § 103(a) over Deering in view of Lyche et al. Accordingly, Applicant respectfully requests that the aforementioned rejection under 35 U.S.C. § 103(a) be withdrawn.

Claim 49

Demmel discloses the use of linear least squares approximation techniques for the purpose of image compression. See pp. 114-117. However, Demmel only teaches compression of the entire image. See Fig. 3.3, pp. 115-116. Therefore, Demmel does not overcome the inadequacies of the Deering reference.

Because Demmel does not overcome the inadequacies of the Deering reference, dependent claim 49, which depends from independent claim 46, is not obvious under 35 U.S.C. § 103(a) over Deering in view of Demmel. Accordingly, Applicant respectfully requests that the aforementioned rejection under 35 U.S.C. § 103(a) be withdrawn.

Claim 50

Kostrzewski et al. discloses a method of still image compression using isomorphic singular manifold projection whereby surfaces of objects having singular manifold representations are represented by best match canonical polynomials to arrive at a model compressed using standard lossy compression. See Abstract. In this process, Kostrzewski et al. teaches segmenting an original image into blocks of pixels, then selecting coefficients for each image segment for canonical polynomials having the lowest Q. See column 23, line 60 – column 24, line 8. Therefore, Kostrzewski et al. does not teach the determination of a minimal polynomial degree required for the correct reproduction of a geometrical part, as required by claim 50. Thus, Demmel does not overcome the inadequacies of the Deering reference.

Because Kostrzewski et al does not overcome the inadequacies the Deering reference, dependent claim 50, which depends from independent claim 46, is not obvious under 35 U.S.C. § 103(a) over Deering in view of Kostrzewski et al. Accordingly, Applicant respectfully requests that the aforementioned rejection under 35 U.S.C. § 103(a) be withdrawn.

Claim Rejections – Independent Claims Rejected Under 35 USC §103(a)

Claims 16-23, 28-30 and 43-45 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view Kono. Dependent claim 24 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Kono and further in view of Go. Finally, dependent claim 31 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Deering in view of Kono and further in view of Chen et al.

Claims 16-23, 28-30 and 43-45

The present invention is further a graphics decompressor, comprising: (1) a receiver for reception of graphical data in a compressed, functional form, (2) a geometry evaluator, following said receiver, for evaluation of said graphical data in respect of a predetermined set of shapes and forms stored at said decompressor, and (3) a piecewise linear surface approximator following said geometry evaluator, for reconstruction of said evaluated data on a piecewise basis, into geometrical entities.

The present invention is also a system for analysis, compression, transmission and decompression of arbitrary graphical data, the system comprising: (1) a graphical data-compressor for compression of received, arbitrary graphical data, said graphical data-compressor comprising: (1a) an input for reception of arbitrary graphical data, (1b) an analyzer, linked to said input, for analysis of said received arbitrary graphical data into constituent geometrical parts, where at least some of said constituent geometric parts comprise predetermined shapes and forms, (1c) a describer, linked to said analyzer, for description of said constituent geometrical parts as an functional description, where said functional description comprises a high level functional form representing one of said constituent geometrical parts, and (1d) a transmitter, linked to said analyzer, for

transmission of said functional description over a data link; said system further comprising (2) a graphical data decompressor for decompression of said functional description into geometric entities, the decompressor comprising: (2a) a receiver for reception of said functional description from said data link, and (2b) a geometry evaluator for evaluating said functional description in terms of high-level functional forms, thereby to decompress said compressed graphical data descriptions.

The present invention is also a method for decompressing a functional description of graphical data, said functional description being in terms of high-level functional forms and associated parameters, the method comprising: evaluating said functional description in terms of said plurality of high-level functional forms, and generating geometric entities using said evaluation where at least some of said geometric entities comprise predetermined shapes and forms.

As stated *infra*, Deering does not disclose at least the use of high level functional forms representing constituent geometrical parts.

Kono teaches a method for transmitting data in a block format in which each block is provided with one or more of a predetermined degree of functions each having respective coefficients corresponding to respective terms thereof and defining a plane or curved surface. See column 1, lines 54-66. Kono discloses the use of piecewise linear approximation for the polynomial form at the target. See column 3, lines 4-31. However, Kono does not teach a piecewise linear surface approximator following the geometry evaluator, for reconstruction of evaluated data on a piecewise basis, into geometrical entities, as required by independent claim 16. Moreover, Kono also does not disclose at least the use of a high level functional forms, as required by independent claim 16.

Therefore, independent claims 16, 28 and 43 are not obvious under 35 U.S.C. § 103(a) over Deering in view of Kono. Accordingly, Applicant respectfully requests that the aforementioned rejection under 35 U.S.C. § 103(a) be withdrawn.

Because dependent claims 17-23 depend from independent claim 16, dependent claims 29-30 depend from independent claim 28, and dependent claims 44-45 depend from independent claim 43, these claims are also not obvious under 35 U.S.C. § 103(a) over Deering in view of Kono. Accordingly, Applicant respectfully requests that the aforementioned rejection under 35 U.S.C. § 103(a) be withdrawn.

Claim 24

For the reasons stated *infra*, because Kono and Go do not overcome the inadequacies of Deering, claim 24, depending from independent claim 16, is not obvious under 35 U.S.C. § 103(a) over Deering in view of Kono and further in view of Go. Accordingly, Applicant respectfully requests that the aforementioned rejection under 35 U.S.C. § 103(a) be withdrawn.

Claim 31

Chen, et al. teach the use of various networking technologies for the transmission of compressed video data. See col. 4, line 59 – col. 5, line 1 and col. 35, line 1 – line 5. Because Chen et al. do not overcome the inadequacies of Deering, claim 31, depending from independent claim 28, is not obvious under 35 U.S.C. § 103(a) over Deering in view of Kono and further in view of Chen et al. Accordingly, Applicant respectfully requests that the aforementioned rejection under 35 U.S.C. § 103(a) be withdrawn.

In view of the foregoing, it is submitted that claims 1-50 pending in the application are allowable. An early Notice of Allowance is therefore respectfully requested.

Respectfully submitted,

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